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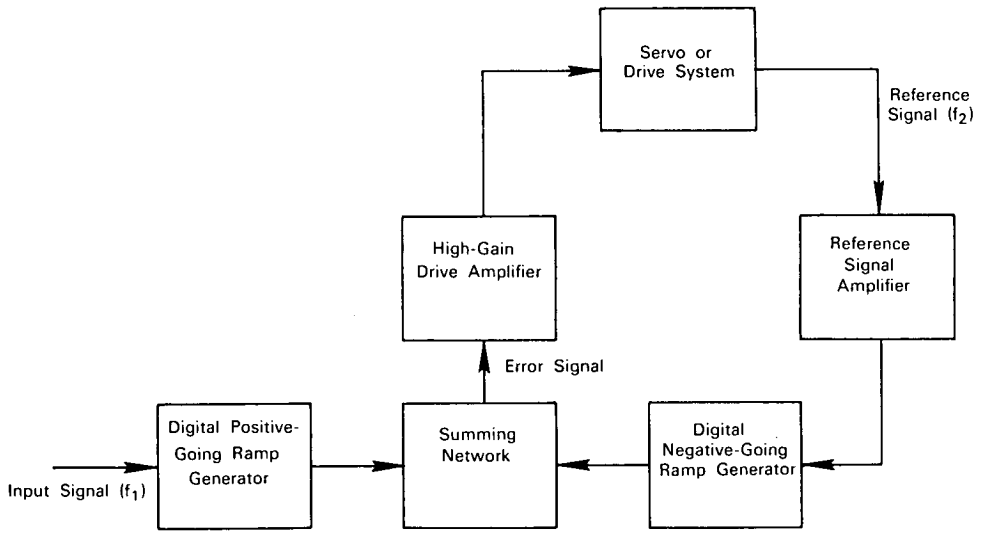
Brief 65-10096

NASA TECH BRIEF

Digital System Accurately Controls Velocity of Electromechanical Drive



The problem: Accurately controlling the velocity of an electromechanical drive mechanism. An example of such a mechanism is the drive for the mirror in an interferometer-type spectrometer. Analog circuits which have been used to provide velocity control depend on the gain and phase characteristics of the circuit components. Environmental conditions and component aging tend to alter these characteristics and reduce the attainable control accuracy.

The solution: The use of a digital circuit, rather than an analog circuit, to control the velocity of the drive mechanism. Since the essential electronic components used in the digital circuit function only as switches (open or saturated), their gain and phase characteristics are relatively unimportant.

How it's done: The digital circuit consists of five basic units: a digital positive-going ramp generator, a digital negative-going ramp generator, a summing network, a high-gain drive amplifier, and a reference-signal amplifier. The input signal, at frequency f_1, is coupled to the digital positive-going ramp, which is coupled to the summing network. A reference signal at frequency f_2 proportional to the velocity of the mirror in the drive system is amplified and fed into the digital negative-going ramp. This reference signal, now in digital form, is also fed into the summing network. The addition of the signals in the summing network results in an error signal. This signal is amplified by the high-gain drive amplifier and used to keep the drive velocity and the reference signal constant.

(continued overleaf)

Notes:

1. The two ramp generators and the summing network may be incorporated into a single unit.
2. The control accuracy depends on the stability of the input signal frequency.
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Goddard Space Flight Center
   Greenbelt, Maryland, 20771
   Reference: B65-10096

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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